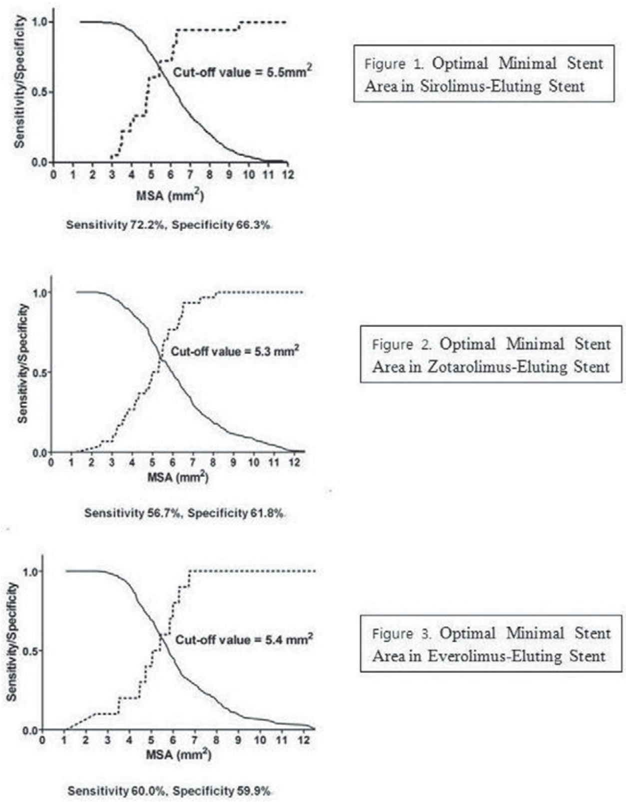

Figure. Optimal Minimal Stent Area in SES,ZES and EES

Conclusion: Post-interventional IVUS MSA is also a strong predictor of restenosis after second-generation drug-eluting stent implantation.

TCT-663

Relationship Between Plaque Composition Assessed With Radiofrequency IVUS and Clinical Outcomes in Patients with Acute Coronary Syndromes and Diabetes Mellitus or Metabolic Syndrome: The PROSPECT Trial

Steven P Marso[1], Nestor Mercado[1], Akiko Maehara[2], Giora Weisz[2], Gary Mintz[2], John McPherson[3], Francois Schiele[4], Dariusz Dudek[5], Martin Fahy[2], Ke Xu[2], Alexandra Lansky[6], Bernard de Bruyne[7], Patrick Serruys[8], Gregg Stone[2]
[1]Saint Luke's Mid America Heart and Vascular Institute, Kansas City, MO; [2]Cardiovascular Research Foundation, New York, NY; [3]Vanderbilt University Medical, Nashville, TN; [4]University Hospital Jean-Minjoz, Besancon, France; [5]Jagiellonian University, Krakow, Poland; [6]Yale University, New Haven, CT; [7]Cardiovascular Center, Onze-Lieve-Vrouwziekenhuis, Aalst, Belgium; [8]Erasmus University, Thoraxcentrum, Rotterdam, Netherlands

Background: We studied angiographic, grayscale and radiofrequency (RF) IVUS characteristics of untreated nonculprit lesions in pts with diabetes (DM) and/or metabolic syndrome (MS) from the PROSPECT trial.
Methods: In PROSPECT, pts with acute coronary syndromes (ACS) underwent 3-vessel quantitative coronary angiography, grayscale, and RF-IVUS after successful culprit lesion stenting. Recurrent MACE (cardiac death/arrest, myocardial infarction or rehospitalization for angina) were adjudicated to originally treated culprit vs. untreated nonculprit lesions in pts with DM, MS or no DM.
Results: Among 673 pts with available cardiometabolic status, 119 (17.6%) had DM and 239 (35.5%) had MS. The 3-year cumulative MACE rate was 29.4% in DM pts, 21.3% in MS and 17.4% in no DM or MS pts (p=0.03). MACE was adjudicated to nonculprit lesions in 18.7%, 11.7% and 9.7% of pts, respectively (p=0.06). In nonculprit MACE lesions, grayscale IVUS measures of plaque burden and minimal luminal area (MLA) were similar in the 3 groups. However, lesions of pts with DM compared to those from MS and no DM pts had significantly greater necrotic core (0.71 ± 0.49 vs 0.61 ± 0.54 and 0.55 ± 0.59 mm2 respectively, p=0.01) and calcified plaque area (0.41 ± 0.38 vs 0.31 ± 0.38 and 0.29 ± 0.37 mm2 respectively, p=0.004). DM patients also had more nonculprit lesions containing >2 high risk plaque features (plaque burden ≥70%, MLA ≤4 mm2 and/or thin cap fibroatheroma) (51.3% vs 45.9% vs 39.5% respectively, p=0.03).
Conclusion: During 3-year follow-up after PCI of all culprit lesions in ACS, MACE due to untreated nonculprit lesions was significantly increased in pts with vs without DM. Although DM and no-DM nonculprit lesions had similar measures of plaque burden and MLA, they contained significantly greater necrotic core, likely contributing to the increased event rate.

TCT-664

SYNTAX Score Reflects Coronary Plaque Characteristics Assessed By Integrated Backscatter Intravascular Ultrasound

Hideaki Ota, Junko Honye, Munenori Okubo, Hiroki Kondo, Taiji Miyake, Shigeshi Kamikawa, Yoshiaki Kawase, Kunihiko Tsuchiya, Hitoshi Matsuo, Katsumi Ueno
Department of Cardiology, Gifu Heart Center, Gifu, Japan

Background: It has been proven that some coronary risk factors have influence on coronary plaque characteristics assessed by intravascular ultrasound (IVUS). However, the relationship between components and complexity of coronary lesions has not been shown. To elucidate the relationship between components of coronary plaques assessed by integrated backscatter IVUS (IB-IVUS) and complexity of coronary lesions quantified by SYNTAX score.
Methods: A total of 85 de novo lesions in 73 patients were classified based on SYNTAX score: low (1 to 7: n=29), medium (8 to 11: n=31), and high score group (12 to 20: n=25). Tissue characteristics of the plaque in the culprit lesion were analyzed using IB-IVUS and classified into four categories: calcified, dense-fibrotic, fibrotic, and lipidic.
Results: There were no significant differences in baseline characteristics including coronary risk factors, vessel area, and total plaque volume of the lesions among three groups. Calcified, dense-fibrotic, and fibrotic components were significantly larger, and lipidic component was significantly smaller in the high score group than those of the low and medium score groups, except the fibrotic component between high and medium score group (Table).

Table:

	SYNTAX score		
	low (1-7)	medium (8-11)	high (12-20)
calcified (%)	0.6±0.6 ‡‡	1.0±0.8 ‡	1.9±1.8
dense fibrotic (%)	2.7±2.1 ‡‡	3.9±2.8 ‡	5.9±3.7
fibrotic (%)	33.0±14.0 ‡	35.0±11.8 §	42.5±12.9
lipidic (%)	63.8±16.3 ‡‡	60.1±14.7 ‡	49.7±16.8

‡‡: p<0.01 vs. high score group

‡: p<0.05 vs. high score group

§: p=0.055 vs. high score group

Conclusion: The strong relationship between complexity of the lesions quantified by SYNTAX score and plaque components analyzed by IB-IVUS was demonstrated. The higher SYNTAX score, the more fibrosis and calcification were found in the plaque. These results suggest that it is necessary to care about under-expansion due to hard plaque in the high SYNTAX score and distal embolization due to high lipid contents within the plaques in lower SYNTAX score.

TCT-665

Association between Novel Three-Dimensional Geometrical Lesion Analysis and Indicators of Plaque Vulnerability

Danny Dvir[1], Ifat Lavi[1], Shmuel Einav[2], Ran Kornowski[1]
[1]Rabin Medical Center, Petah-Tikva, Israel; [2]Tel-Aviv University, Tel-Aviv, Israel

Background: Vascular geometry mediates fluid dynamics and shear stress and may thereby predispose coronary arteries to atherosclerosis. However, the association between three-dimensional (3D) vascular geometrical features in space and vulnerability to plaque rupture, has not been investigated.
Methods: We evaluated 32 de novo coronary lesions by 3D coronary angiography (CardiOp-B system, Paieon Inc). For geometrical analysis we developed a novel algorithm that enables quantitative point evaluation of several geometrical features along a vessel segment: defined mathematically by curvature and torsion, in numerous points along the vessel path, and by the level of segment tortuosity. These parameters describe the geometrical path in space and do not depend on the evaluated segment projection. Segments were further evaluated by IVUS-VH (Volcano Corp.). For each segment we collected data on 4 slices: proximal reference, distal reference, minimal lesion area slice, and maximal necrotic core slice. On each slice we performed a conventional IVUS examination that characterized the lesion parameters and performed VH evaluation with calculation of the area and relative size of different plaque components: fibrotic (F), fibrofatty (FF), DC, NC, NC/DC.
Results: We evaluated a total length of 633.97mm segments and performed geometrical analysis on 4,403 points (6.9 points on average per 1mm segment). We performed VH evaluation on 1,268 slices with a total vessel volume of 12,170 cc3. Several geometrical measures were significantly correlated with IVUS-VH indicators of plaque vulnerability as measured by sectional necrotic-core to dense-calcium ratio: mean and max. lesion curvature (R=0.56, p=0.0008; R=0.61, p=0.0004); lesion tortuosity (R=0.44, p= 0.011).
Conclusion: Coronary lesion tortuosity and curvature are significantly correlated with indicators of plaque vulnerability. These data provide new insight into the role of 3D vascular geometry in determining plaque instability.